injection device is in a starting position for dispensing a dosage of the fluid product from the product container.

Figure 2b shows the injection device of Figure 1 in a second state in which the lever 7 is pivoted or pushed in the radial direction, into the casing. The contact point 12 between the oblique surface 11 of the protrusion 9 and the facing surface 6 of the piston rod 5 lies further away from the tip of the protrusion 9 than the contact point shown in Figure 2a. Due to the geometry of the triangle formed by the piston rod 5, the lever arm 8 and the oblique surface 11 of the protrusion 9, it is possible when pivoting the lever 7 to generate a force in the direction of the longitudinal axis of the casing, onto the outlet of the product container 1. When the lever 7 is pivoted into the casing 3, the contact point 12 slides along the oblique surface 11, which converts the movement of the protrusion 9 in the radial direction of the casing 3 into a force component in the longitudinal direction of the casing 3. Using the force component in the longitudinal direction of the casing 3, the piston rod 5 can shift the piston towards the outlet of the product container and administer a product dosage.

With continued reference to Figure 2, which includes Figures 2a-e , Figures 2c and 2d depict an embodiment wherein an activating member 17 may be provided in order to effect actuation of the dispensing mechanism upon displacement of the side lever 21 from a first position to a second, inwardly retracted position. The activating member also acts as a safety mechanism to prevent disposal of fluid product through the needle upon inadvertent displacement of, or application of force to, the side lever 21. Generally, the activating member 17 works in cooperation with the split nut 202 and split nut sleeve 204, which belong to a holding mechanism for holding or restraining parts of the dispensing mechanism as ampoules are changed, to cause selective engagement and disengagement of the split nut 202 with the threaded drive rod assembly 201, 203, 219 depending on or reflecting the radial position of the activating member 17. More particularly, in one embodiment, the activating member 17 cooperates with a coupling sleeve which is shown in Figure 2d generally next to the activating member 17. Referring to Figure 2e, moving the activating member 17 from the first stop 54 to the second stop 55 results in turning the coupling sleeve, the sleeve 201, the split nut 202 and the split nut sleeve 204 on the threaded rod. The activating member 17 may include a radial projection 50 extending through an opening 52 in the housing 223, 224. The radial projection 50 enables a user of the injection device to position the

activating member 17 at a first position, wherein the radial projection 50 abuts a first stop 54, or a second position, wherein the radial projection 50 abuts a second stop 55.

In one embodiment, with the radial projection 50 positioned against the first stop 54, displacement of the side lever 21 has no effect on the dispensing mechanism (e.g., displacement of the threaded rod assembly 201, 203, 219). However, with the radial projection 50 positioned against the second stop 55, the split nut 202 is engaged at a specified longitudinal location with the threaded rod 203. Thus, upon inward displacement of the side lever 21, the threaded rod 203 is advanced or displaced a predetermined distance along the longitudinal axis of the injection device. Additionally, displacement of the side lever 21 may also result in the radial displacement of the activating member 17 such that radial projection 50 is positioned back against the first stop 54 thereby disengaging the split nut 202 from the threaded rod 203 and preventing further actuation of the dispensing mechanism until the radial projection 50 is repositioned by the user to abut the second stop 55 [[56]]. In one embodiment, repositioning of the activation member 17 (i.e., moving the radial projection 50 against the second stop 55 [[56]]) causes the split nut 202 to reengage the threaded rod 203 at a new longitudinal location therealong such that each time the activation member 17 is reset, the activation member 17 ~~threaded rod 3~~ is longitudinally displaced an additional predetermined distance relative to the threaded rod 203.

In another embodiment, the injection device may be configured such that, upon displacement of the side lever 21 from the first position to the second, inwardly retracted position, the side lever 21 is retained in the second position by a latching member/mechanism until the radial projection 50 of the activating member 17 is displaced from the first stop 54 to the second stop 55 [[56]] thereby releasing the side lever 21 back to its first position. Such displacement of the radial projection 50 (i.e., from the first stop 54 to the second stop 55 [[56]]) also results in the split nut 202 being released from and longitudinally repositioned relative to, the threaded rod 203. The radial projection 50 must then be displaced back to the first stop 54, thereby reengaging the split nut 202 with the threaded rod 203, in order for further advancement of the threaded rod 203 upon actuation of the side lever 21.

In some embodiments, displacement of the displacement of the side lever 21 to an inward position results in an axial movement of the threaded rod assembly and disengages the coupling sleeve of the activating member 17. In some embodiments, turning the activating member 17 while the coupling

sleeve is disengaged does not effect the dosing or dispensing mechanism. In some embodiments, when the lever 21 is moved back to its initial outward position, the coupling sleeve is automatically reengaged to the activating member 17. In some embodiments, pushing the side lever 21 again before the activating member 17 is moved once more has no effect on the dispensing mechanism. First the activating member 17 must be moved or displaced (which moves the reengaged coupling sleeve), then the displacement of the side lever ~~liver~~ 21 results in dispensing the medicament. In some embodiments, in its inward position, the lever 21 is retained to indicate the completion of dispensing the medicament and is released by activating the activating member 17. Generally speaking dosing mechanisms and their functions are known in the art, and such mechanisms and/or their components may be selected as suitable and/or desired for use in the present invention.

Figure 3 shows a second embodiment of an injection device as set forth in the present invention, in which there is a sliding connection between the protrusion 9 of the lever 7 and the facing surface 6 of the piston rod 5. The sliding connection is formed by a T-connection formed by a T-shaped attachment 14 extending along the oblique surface 11 of the protrusion 9 and two mutually opposing hooks 15 and 16 projecting from the facing surface 6. The hooks 15 and 16 enclose the T-bar of the T-shaped attachment 14 between themselves and the facing surface 6, such that the protrusion 9 cannot be moved from the facing surface 6 in the direction of the longitudinal axis of the casing 3. In the radial direction with respect to the casing 3, however, the protrusion 9 comprising the T-shaped attachment 14 can be slid within the hooks 15 and 16. When the lever 7 is pivoted into the casing 3, therefore, the T-shaped attachment 14 slides along the facing surface 6, within the hooks 15 and 16. The oblique surface 11 of the protrusion 9 is then formed by the upper side of the T-bar of the T-shaped attachment 14.

Furthermore, an indicator for indicating a product amount in the product container can be provided in an injection device as set forth in the embodiments shown in Figures 1 to 3. As shown in Figures 1 and 3, the indicator can be formed by a scale drum 317 and a window 18 in the casing 3. The scale drum 317 comprises a scale having a graduation of whole numbers of units. Furthermore, a grating 19 is provided on an exterior circumferential surface of the scale drum 317. An actuator 22 pointing radially to the longitudinal axis of the injection device is provided on the lever 7, said actuator pointing towards the scale drum 317 and co-operating with the grating 19. Another latching means 20 may be provided on a facing surface of the scale drum 317, said latching means co-operating with a complementary latching

means [[20']] (not shown) of a sleeve-shaped element 321 adjacent to the scale drum 317. Due to the scale drum 317 co-operating with the sleeve-shaped element 321 via the latching means 20 and [[20']] the complementary latching means (not shown), the scale drum 317 is blocked against rotating in one direction, whereas it remains possible for it to rotate in the opposite direction.

Figure 4a shows the injection device in the first state as set forth in Figure 2a, in a cross-section. Accordingly, the injection device is in a starting position for administering a product dosage, in which the lever 7 is in a position pivoted away. The actuator 22 engages, via its front tip, with the grating 19 of the scale drum 317. Figure 4b shows the injection device in a second position as set forth in Figure 2b, in which the lever 7 is in a position pivoted in. When the lever is pivoted, the actuator 22 is shifted in the radial direction into the casing 3 together with the lever 7, which causes the scale drum 317 to rotate since the actuator 22 pushes against the grating in the rotational direction of the scale drum 317. During a pivoting movement, the scale drum 317 is preferably rotated on by a distance corresponding to the distance between two scale units on the scale drum. It is therefore possible to rotate the scale drum 317 on by one unit with every administering, i.e., with each pivoting of the lever. Preferably, the scale drum counts from a highest numerical value to a lowest numerical value, such that the dosage units remaining in the product container can be read from the indicator. When the lever 7 is pivoted back out of the casing 3 of the injection means, the actuator 22 is pulled across the grating 19, since the tip of the actuator 22 can slide over a bevel of the grating. Also, the scale drum 317 is fixed in an opposite rotational direction by the latching means 20 and [[20']] the complementary latching means (not shown) of the adjacent sleeve-shaped element 321.

In accordance with another aspect of the present invention, the injection device in a third embodiment shown in Figure 5 comprises a dosing means including a release element in accordance with the present invention. To release a dosage, i.e., to limit the movement of the piston rod in the longitudinal direction in accordance with a desired product dosage, a conventional dosing rotary mechanism can be used. However, such a rotary mechanism is operated in accordance with the invention using a releasing element which projects, in the form of a lever 23, in the radial direction from the injection device. The lever 23 projects outwards